

USMLE PREP LECTURE SERIES Lecture 2.2



ELITE MEDICAL PREP

Elite Medical Prep Guide for Ben Gurion
Students from Day 1 to Test day

Objectives

- 🍎 5 month planning
- 🍎 Flashcards: To Use or not to use?
- 🍎 Challenge Questions on Renal
 - Challenge Questions on Renal



What You'll Need

1

UW and the number of questions per system



2

Your Chosen Other Resources



3

Your Chosen Format



Flashcards:



Video Series:



Topical Help:



The First ~4 Months (80% of your time)

First 4 Months

CARDIOLOGY

PULMONOLOGY

RENAL

ENDOCRINE

- 1 UW system at a time
- 2-3 hours per day: Half on reading/videos, Half on questions
- 1 hour (total) per day: flashcards
- ~25-40 questions per day until the topic is complete. Tutor/timed mode are fine
- 1-2 days for review of incorrects
- Build in a break/catch-up day in between



The First ~4 months (80% of your time)

First 4 Months

CARDIOLOGY

PULMONOLOGY

RENAL

ENDOCRINE

SAMPLE:

1.5HR: Read FA
1.5HR: 25 Qs

1.5HR: Read FA
1.5HR: 25 Qs

1.5 HR: Pathoma Cardiac
1.5HR: 25 Qs

1.5 HR: Pathoma Vascular
1.5HR: 25 Qs

1.5 HR: Boards & Beyond
1.5HR: 25 Qs

2HR: Boards & Beyond
2HR: 40 ?s

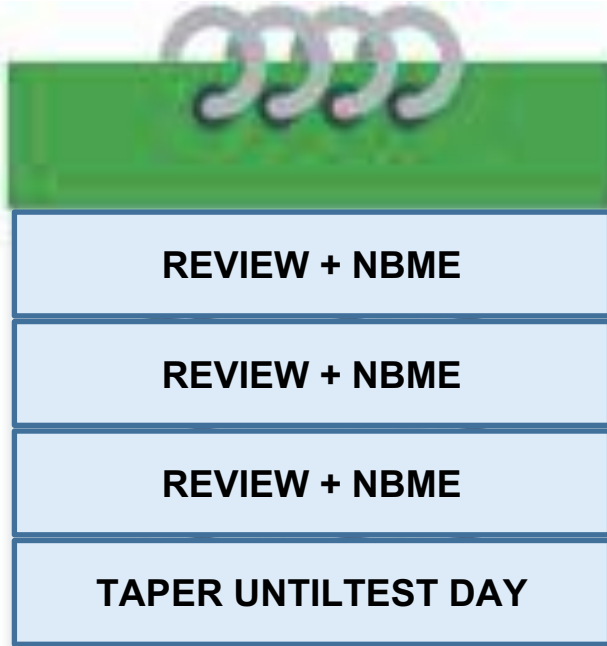
Continue until Qs are done.

3HR: Review Incorrect CV Qs

+1 day for Catch-up and/or Review



The Last ~1 month (20% of your time)



- **Mixed, Timed Review – 120-160 Qs (3-4 blocks) per day**
- **3 NBMEs: Average score is your objective assessment**
- **Taper Question Number until Test Day**
- **Review Flashcards Nightly**

Other Details to Consider

- Do at least 1 NBME as a baseline during the 2-3 months
- For Micro: Sketchy Micro or Micro cards in place of First Aid
- Consider adding a few extra single days to do mixed review of topics previously covered
- Make Flashcards Daily, Review Nightly
- Consider YOUR personal schedule – Vacation, days off, Holidays, etc.
- Finally, STICK TO YOUR PLAN, BUT BE FLEXIBLE.



USMLE Practice Question Breakdown

3

A 26 year old woman is brought to the emergency department by her roommate because of vomiting for 4 hours. She also has a 2 day history of fatigue and dizziness on standing. She has had severe heartburn for 3 months; treatment with over-the-counter antacids has provided some relief. The vital signs of the patient are T 35.6C (96F), pulse 110/min, and blood pressure 80/55 mm Hg. Physical examination shows marked pallor. Laboratory studies show a hemoglobin concentration of 6 g/dL and hematocrit of 18%. A chest x-ray is obtained (shown) and a pulmonary catheter is inserted and laboratory values are measured.

4



1

The patient is most likely experiencing which of the following types of shock?

2

- A) Anaphylactic.
- B) Cardiogenic.
- C) Hypovolemic.
- D) Neurogenic.
- E) Septic.

1

The question stem – tells you what the question is asking

2

The answer choices – Given you some context as to what the question is about

3

The prompt – Summarize key information as it's given in your own words; ensure that the answer matches ALL of the information given, not just some

4

Labs and images. EVAL the labs. IGNORE the images.

EMP's SUGGESTED ORDER.

There is no one right way to do this.

Challenge Questions and breakdowns: Nephrology



Renal Question #1

A 24-year-old man with bipolar disorder is brought to the emergency department with lethargy after suffering a seizure at home. He also reports vomiting x 4 earlier that morning and persistent nausea and feeling weak. He is mask ventilated on arrival. His temperature is 98 degrees, pulse is 52, and blood pressure is 160/94. A CT scan of the head shows no abnormalities. Lab studies show:

Na: 159

Glucose: 124

Urine Osmolality: 200 (nl 300- 900)

Which of the following is the most likely cause of this patient's current symptoms?

- A. Central diabetes insipidus.
- B. Impaired renal response to ADH
- C. Inappropriate ADH secretion
- D. Psychogenic polydipsia
- E. Traumatic nephropathy
- F. Type 2 diabetes mellitus
- G. Hypernatremia



Summary?

A 24-year-old man with bipolar disorder is brought to the emergency department with lethargy after suffering a seizure at home. He also reports vomiting x 4 earlier that morning and persistent nausea and feeling weak. He is mask ventilated on arrival. His temperature is 98 degrees, pulse is 110, and blood pressure is 110/80. A CT scan of the head shows no abnormalities. Lab studies show:

Na: 159

Glucose: 124

Urine Osmolality: 200 (nl 300- 900)

Which of the following is the most likely cause of this patient's current symptoms?

- A. Central diabetes insipidus.
- B. Impaired renal response to ADH
- C. Inappropriate ADH secretion
- D. Psychogenic polydipsia
- E. Traumatic nephropathy
- F. Type 2 diabetes mellitus
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Summary

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Na: 159

Glucose: 124

Urine Osmolality: 200 (normal 300- 900)

Which of the following is the most likely cause of this patient's current symptoms?

Young man with bipolar disorder presenting with vomiting, hyponatremia, and dilute urine



What do we know about these answers?

- A. Central diabetes insipidus
- B. Impaired renal response to ADH
- C. Inappropriate ADH secretion
- D. Psychogenic polydipsia
- E. Traumatic nephropathy
- F. Type 2 diabetes mellitus
- G. Hypernatremia of dehydration



What do we know about these answers?

- A. Central diabetes insipidus – lost free water, high serum sodium, Pituitary doesn't make ADH, dilute urine
- B. Impaired response to ADH– AKA nephrogenic DI, lost free water, high serum sodium, kidneys don't respond to ADH (nephrogenic DI), dilute urine
- C. Inappropriate ADH secretion – AKA SIADH, retained free water, low serum sodium, pituitary makes too much ADH, concentrated urine
- D. Psychogenic polydipsia – high intake of free water, dilutes serum sodium, kidneys respond appropriately to get rid of water (dilute urine)
- E. Traumatic nephropathy – blood and high Cr
- F. Type 2 diabetes mellitus – high glucose, glucosuria, proteinuria
- G. Hypernatremia of dehydration – High serum Na⁺, kidneys respond by retaining free water and concentrating urine



Eliminate

- A. Central diabetes insipidus – **lost free water, high serum sodium, Pituitary doesn't make ADH, dilute urine**
- B. Impaired response to ADH– **lost free water, high serum sodium, kidneys don't respond to ADH (nephrogenic DI), dilute urine**
- C. ~~Inappropriate ADH secretion – retained free water, low serum sodium, pituitary makes too much ADH, concentrated urine~~
- D. ~~Psychogenic polydipsia – high intake of free water, dilutes serum sodium, kidneys respond appropriately to get rid of water (dilute urine)~~
- E. ~~Traumatic nephropathy – blood and high Cr~~
- F. ~~Type 2 diabetes mellitus – high glucose, glucosuria, proteinuria~~
- G. Hypernatremia of dehydration – **High serum Na⁺, kidneys respond normally to get rid of Na⁺**



Hypernatremia (of dehydration)

High Na

Kidney gets rid of Na

Urine is CONCENTRATED

Diabetes Insipidus

Kidney doesn't respond to ADH

Excessive water loss via kidney

High serum Sodium

Urine is DILUTE

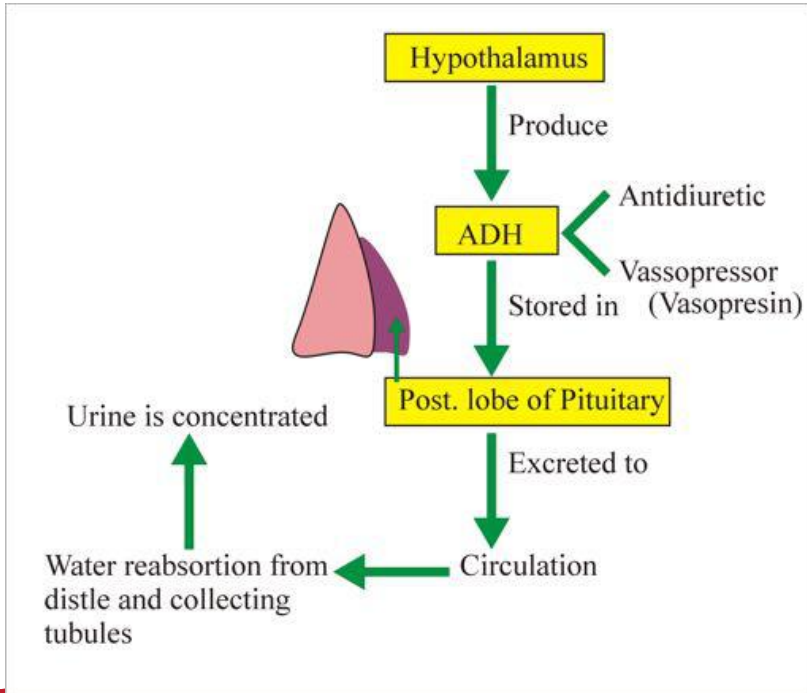


Answer: nephrogenic DI due to lithium

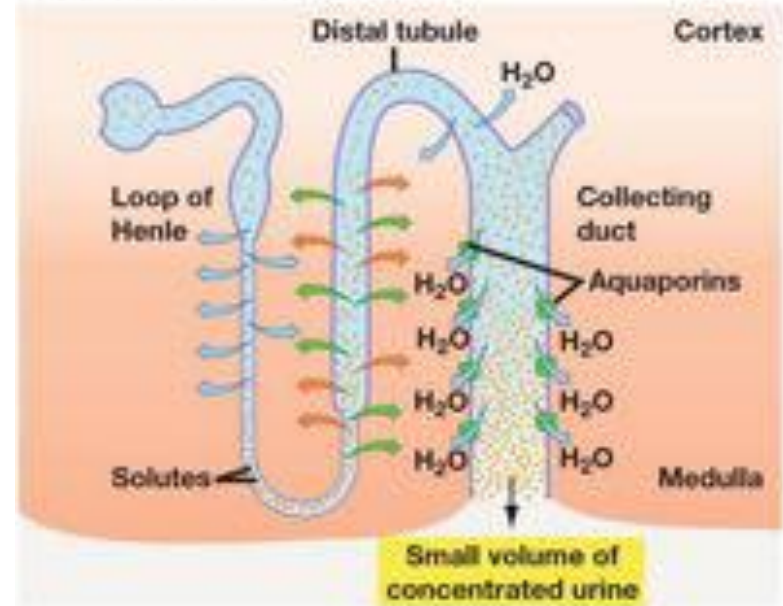
- A. Central diabetes insipidus – **lost free water, high serum sodium, Pituitary doesn't make ADH, dilute urine**
- B. Impaired response to ADH– **lost free water, kidneys don't respond to ADH (nephrogenic DI), dilute urine, high serum sodium,**
- C. ~~Inappropriate ADH secretion – retained free water, low serum sodium, pituitary makes too much ADH, concentrated urine~~
- D. ~~Psychogenic polydipsia – high intake of free water, dilutes serum sodium, kidneys respond appropriately to get rid of water (dilute urine)~~
- E. ~~Traumatic nephropathy – blood and high Cr~~
- F. ~~Type 2 diabetes mellitus – high glucose, glucosuria, proteinuria~~
- G. ~~Hypernatremia of dehydration – High serum Na⁺, kidneys respond normally to get rid of Na⁺~~



ADH axis/pathway



(a) ADH present: Collecting duct is highly permeable to water.



Answer: nephrogenic DI due to lithium

- A. ~~Central diabetes insipidus — lost free water, high serum sodium, Pituitary doesn't make ADH, dilute urine~~
- B. Impaired response to ADH— **lost free water, kidneys don't respond to ADH (nephrogenic DI), dilute urine, high serum sodium,**
- C. ~~Inappropriate ADH secretion — retained free water, low serum sodium, pituitary makes too much ADH, concentrated urine~~
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- F. ~~Type 2 diabetes mellitus — high glucose, glucosuria, proteinuria~~
- G. ~~Hypernatremia — High serum Na⁺, kidneys respond normally to get rid of Na⁺~~



How would you change this to be SIADH?

A 24-year-old man with bipolar disorder is brought to the emergency department with lethargy after suffering a seizure at home. He also reports vomiting x 4 earlier that morning and persistent nausea and feeling weak. He is mask ventilated on arrival. His temperature is 98 degrees, pulse is 52, and blood pressure is 160/94. A CT scan of the head shows no abnormalities. Lab studies show:

Na: 159

Glucose: 124

Urine Osmolality: 200

Which of the following is the most likely cause of this patient's current symptoms?

Disorder	Serum Na+	Serum Osmo	Urine Osmo
SIADH	↓	↓	↑
Dehydration	↑	↑	↑
Diabetes Insipidus	↑	↑	↓

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How would you change this to be SIADH?

A 24-year-old man with bipolar disorder is brought to the emergency department with lethargy after suffering a seizure at home. He also reports vomiting x 4 earlier that morning and persistent nausea and feeling weak. He is mask ventilated on arrival. His temperature is 98 degrees, pulse is 52, and blood pressure is 160/94. A CT scan of the head shows no abnormalities. Lab studies show:

Na: 120

Glucose: 124

Urine Osmolality: 1000

Which of the following is the most likely cause of this patient's current symptoms?

**Need to have HYPONatremia in SIADH
Urine would need to be concentrated (anti-diuretic)**



Renal Question #2

A 58 year old female with a 30 pack year smoking history presents to her physician for a check up. Her blood pressure is 150/90, pulse 80, BMI is 26.1. She has been taking several anti-hypertensive medications for months. Serum studies show hypokalemia, normal serum sodium, increased plasma renin activity, and increased serum aldosterone concentrations. A right abdominal bruit is heard on physical examination.

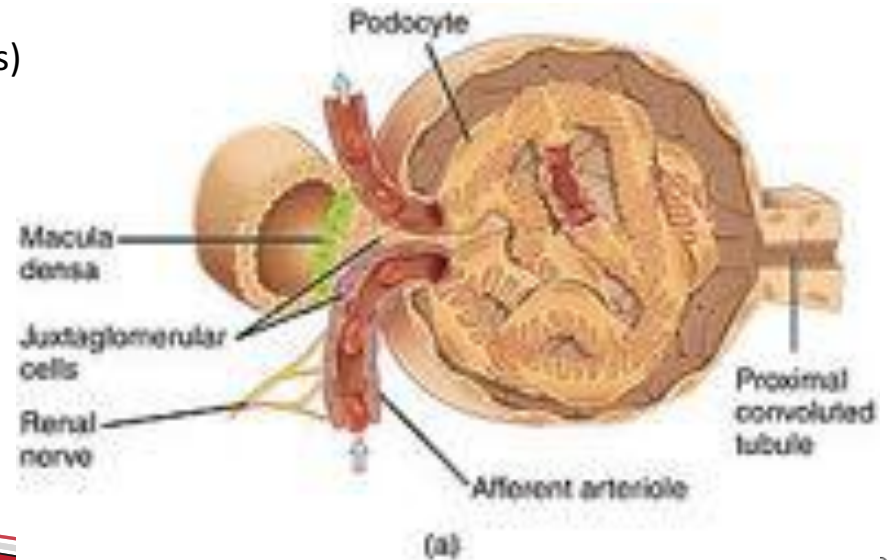
Part A

Which of the following is the most likely cause of these abnormal laboratory findings in this patient?

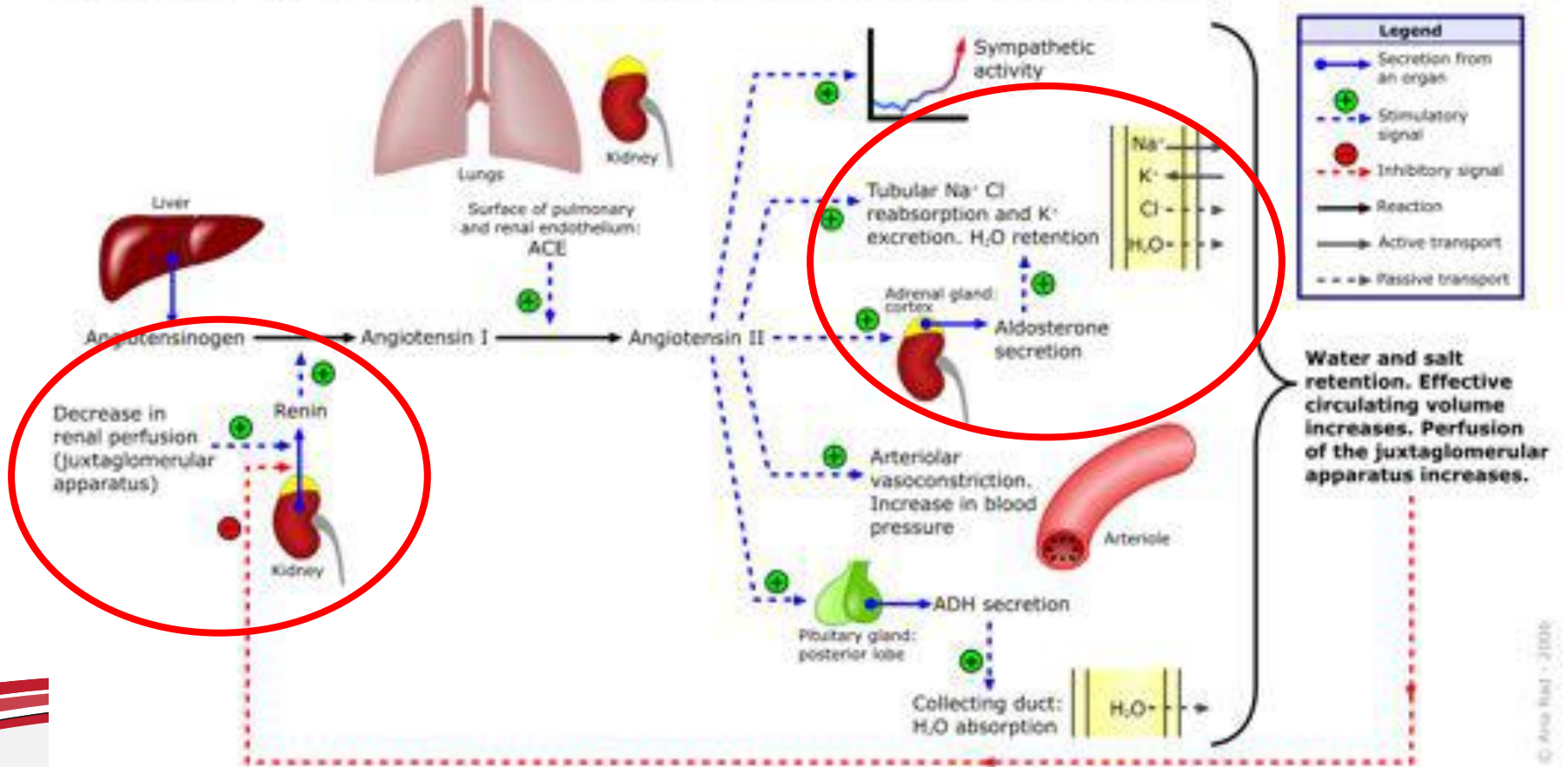
- A. Catecholamine-secreting tumor
- B. Chronic glomerulonephritis
- C. Cushing syndrome
- D. Essential hypertension
- E. Aldosterone-secreting adrenal tumor
- F. Renal artery stenosis
- G. Cholesterol embolization syndrome

Renin-Angiotensin-Aldosterone-System Activation

- RAAS activation occurs when:
 - Low circ. intravascular volume, **Low renal perfusion**
 - Dehydration, blood loss, shock
 - Normal or HIGH circulating volume, but still **low renal perfusion**
 - Heart failure
 - Obstruction of blood flow to kidneys (stenosis)
- Function of aldosterone:
 - “Save sodium”,
 - “push out potassium and H+”



Renin-angiotensin-aldosterone system



A 58 year old female with a 30 pack year smoking history presents to her physician for a check up. Her blood pressure is 150/90, pulse 80, BMI is 26.1. Serum studies show hypokalemia, increased plasma renin activity, and increased serum aldosterone concentrations. A right abdominal bruit is heard on physical examination.

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- A. ~~Catecholamine secreting tumor~~
- B. ~~Chronic glomerulonephritis~~
- C. ~~Cushing syndrome~~
- D. ~~Essential hypertension~~
- E. ~~Aldosterone secreting adrenal tumor~~
- F. Renal artery stenosis
- G. ~~Cholesterol embolization syndrome~~

Aldo-secreting tumor

High aldosterone

LOW renin !

Aka "Conn's Syndrome"

Renal Artery Stenosis

High aldo

High renin

Risk: smoking,
atherosclerosis;

Abdominal bruit (noise)

Review: High-Yield Associations

Renal Cell Carcinoma	EPO → polycythemia
Carcinoid tumors (appendix, lung)	Serotonin → carcinoid syndrome (can progress to pellagra – why?)
<u>Small cell lung cancer</u>	<u>ACTH, SIADH, Lambert-Eaton</u> <u>(Small cell → syndromes)</u>
<u>Squamous cell lung cancer</u>	<u>PTHrP (Sca++mous cell)</u>
Gastric adenocarcinoma	Trousseau's; acanthosis nigricans; Leser-trelat; dermatomyositis
Thymoma	Myasthenia Gravis
Pancreatic adenocarcinoma	Trousseau's
Pheochromocytoma	Not actually paraneoplastic

Key Concepts: Renal Artery Stenosis

- Atherosclerosis of renal artery(ies) – same risk factors (smoking, hyperlipidemia, HTN, DM, fam hx)
- Results in secondary HTN (unresponsive to typical anti-hypertensives)
- Differential: fibromuscular dysplasia, primary hyperaldosteronism
- Medications to avoid in renal artery stenosis:
 - NSAIDS (further vasoconstriction)
 - ACE inhibitors – used with caution in bilateral RAS (further decrease GFR)



Follow-up Question

A 63 year old man comes to the physician because of an abnormal blood pressure reading taken during a health fair one week ago. He has no history of major medical illness. At a previous exam six months ago, his blood pressure was 135/85. His blood pressure today is 170/98. The patient's father died of an MI at 63. A bruit is heard over the left abdomen. Which of the following sets of changes is most likely in this patient?

	Peripheral Vascular Resistance	Renin	Aldosterone
A.	UP	UP	UP
B.	UP	UP	Down
C.	UP	Down	UP
D.	UP	Down	Down
E.	Down	UP	UP
F.	Down	UP	Down
G.	Down	Down	UP
H.	Down	Down	Down



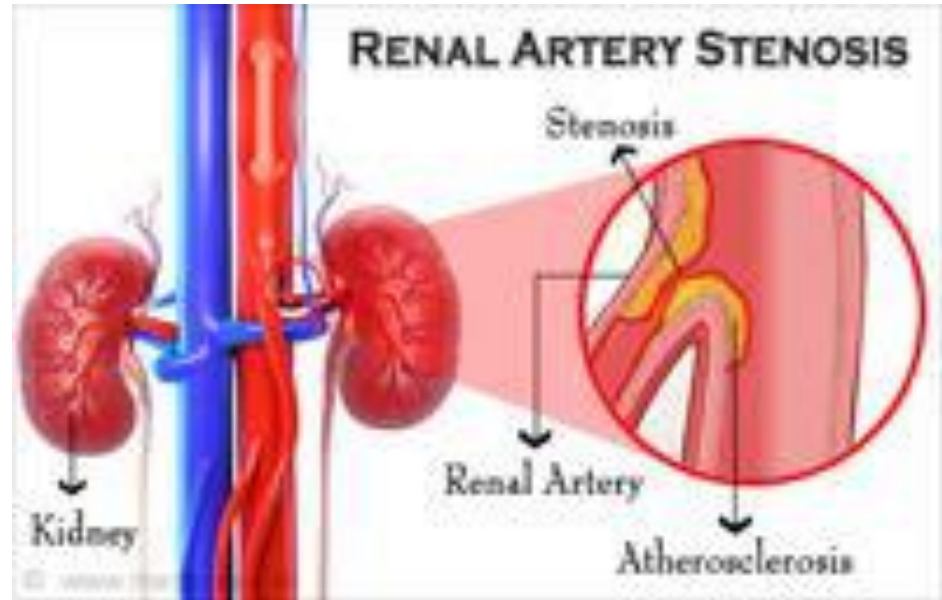
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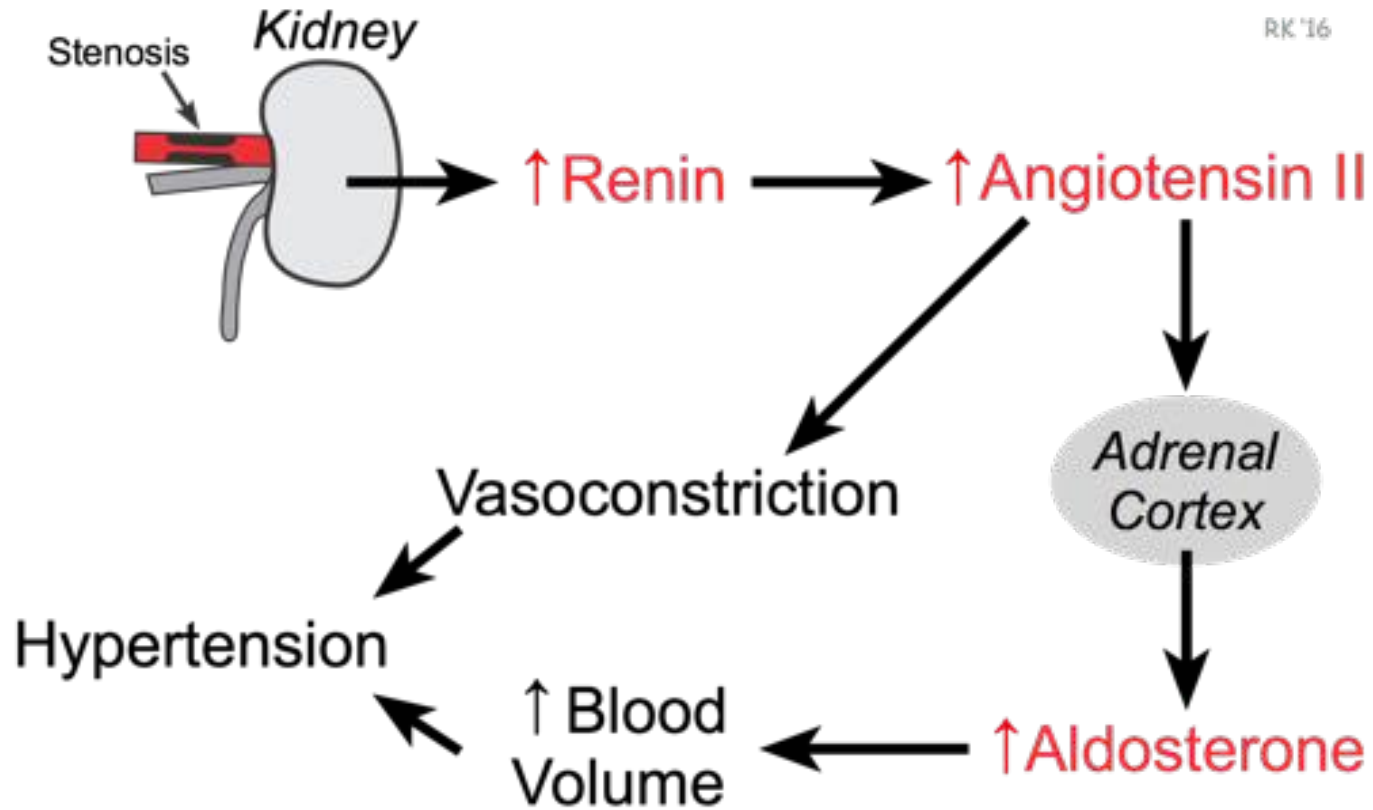
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C.	UP	Down	UP
D.	UP	Down	Down
E.	Down	UP	UP
F.	Down	UP	Down
G.	Down	Down	UP
H.	Down	Down	Down

Bruit = Renal artery stenosis again!







Answer?

A 63 year old man comes to the physician because of an abnormal blood pressure reading taken during a health fair one week ago. He has no history of major medical illness. At a previous exam six months ago, his blood pressure was 135/85. His blood pressure today is 170/98. The patient's father died of an MI at 63. A bruit is heard over the left abdomen. Which of the following sets of changes is most likely in this patient?

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C.	UP	Down	UP
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G.	Down	Down	UP
H.	Down	Down	Down



Part B

The patient begins taking a non-opioid drug for lower back pain. Over the next week, her serum creatinine concentration increases from 1.5 to 3.5 mg/dL. The most likely cause of this finding is the drug's ability to inhibit which of the following?

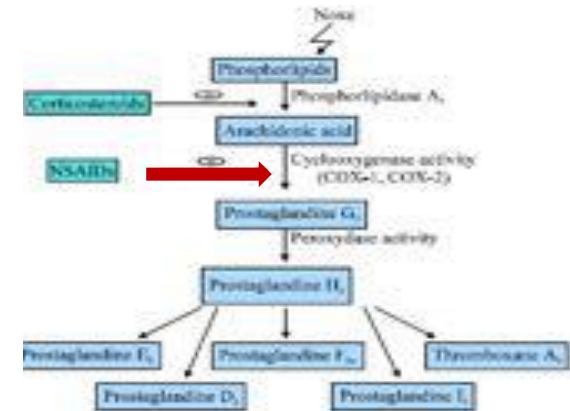
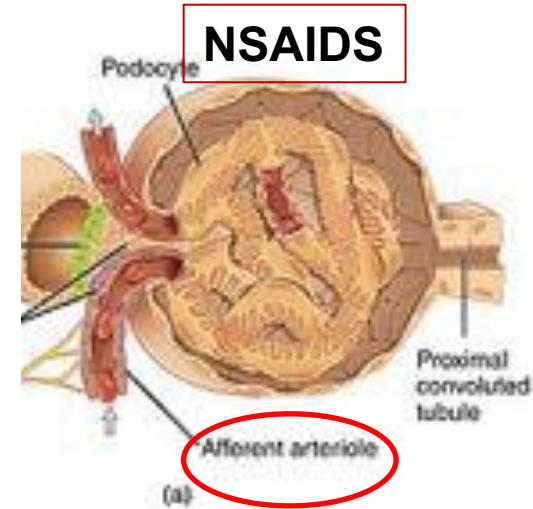
- A. Inflammation in the glomerular capillaries
- B. Inflammation in the renal interstitium
- C. $\text{Na}^+/\text{K}^+/\text{2Cl}^-$ ion cotransport at the Loop of Henle
- D. Prostaglandins that vasoconstrict at the efferent arteriole
- E. Prostaglandins that vasodilate at the afferent arteriole
- F. Urea reabsorption at the proximal tubule and collecting duct



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- D. Prostaglandins that vasoconstrict at the efferent arteriole
- E. **Prostaglandins that vasodilate at the afferent arteriole**
- F. Urea reabsorption at the proximal tubule and collecting duct



Next Steps in our engagement

- ❶ We are available for feedback and questions. A dedicated email has been created for students in your class year at Ben Gurion.
bgustep1@elitemedicalprep.com
- ❷ Please send questions and comments after the sessions to this email. Responses will be prompt and questions relevant to the group will be summarized and shared
- ❸ Collect feedback from you and the students regarding our service, so that we may better serve you all moving forward
- ❹ Check out a dedicated page on our site for your class at www.elitemedicalprep.com/bgustep1





Thank You.

